Hex Inverter with Open-Drain Outputs

High-Performance Silicon-Gate CMOS

The MC74AC/ACT05 is identical in pinout to the LS05. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with TTL outputs.

Features

- Outputs Source/Sink 24 mA
- 'ACT05 Has TTL Compatible Inputs
- These are Pb–Free Devices

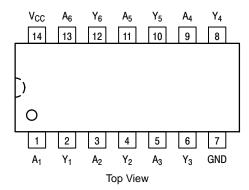


Figure 1. Pinout: 14-Lead Packages

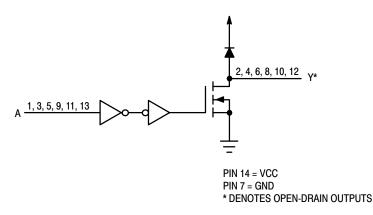


Figure 2. Logic Diagram

1



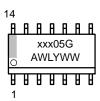
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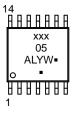


SOIC-14 D SUFFIX CASE 751A





TSSOP-14 DT SUFFIX CASE 948G



xxx = AC or ACT

A = Assembly Location

WL or L = Wafer Lot Y = Year WW or W = Work Week G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

Input A	Output Y
L	Z
H	L

NOTE: Z = High Impedance

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +7.0	V
VI	DC Input Voltage		$-0.5 \le V_{I} \le V_{CC} + 0.5$	V
Vo	DC Output Voltage	(Note 1)	$-0.5 \le V_{O} \le V_{CC} + 0.5$	V
I _{IK}	DC Input Diode Current		±20	mA
I _{OK}	DC Output Diode Current		±50	mA
Io	DC Output Sink/Source Current		±50	mA
Icc	DC Supply Current per Output Pin		±50	mA
I _{GND}	DC Ground Current per Output Pin		±50	mA
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead temperature, 1 mm from Case for 10 Second	ds	260	°C
TJ	Junction temperature under Bias		+ 150	°C
θ_{JA}	Thermal Resistance (Note 2)	SOIC TSSOP	125 170	°C/W
P _D	Power Dissipation in Still Air at 85°C	SOIC TSSOP	125 170	mW
MSL	Moisture Sensitivity		Level 1	
F _R	Flammability Rating Oxygo	en Index: 30% – 35%	UL 94 V-0 @ 0.125 in	
V _{ESD}	Ma	Body Model (Note 3) achine Model (Note 4) device Model (Note 5)	> 2000 > 200 > 1000	V
I _{Latch-Up}	Latch-Up Performance Above V _{CC} and Below C	GND at 85°C (Note 6)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 1. Io absolute maximum rating must be observed.
- 2. The package thermal impedance is calculated in accordance with JESD51–7.
- 3. Tested to EIA/JESD22-A114-A.
- 4. Tested to EIA/JESD22-A115-A.
- Tested to JESD22-C101-A.
- 6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Тур	Min	Unit
.,	Overally Vallage	'AC	2.0	5.0	6.0	.,,
V _{CC}	Supply Voltage	'ACT	4.5	5.0	5.5	V
VREG	DC Regulated Power Voltage (Ref. to GND)		0	_	V _{CC}	V
			-	150	_	
t_r , t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	_	40	_	ns/V
	No Bevious except commit inputs	V _{CC} @ 5.5 V	_	25	_	
	Input Rise and Fall Time (Note 2)	V _{CC} @ 4.5 V	_	10	_	0.4
t _r , t _f	'ACT Devices except Schmitt Inputs	V _{CC} @ 5.5 V	_	8.0	_	ns/V
TJ	Junction Temperature (PDIP)			_	140	°C
T _A	Operating Ambient Temperature Range			25	85	°C
I _{OH}	Output Current – HIGH			_	-24	mA
I _{OL}	Output Current – LOW		_	_	24	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

- V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
 V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

			74.	AC	74AC		
Symbol	Parameter	V _{CC} (V)	T _A = -	-25°C	T _A = -40°C to +85°C	Unit	Conditions
		(-,	Тур	G	uaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	Ι _{ΟUT} = 50 μΑ
		3.0 4.5 5.5	- - -	0.36 0.36 0.36	0.44 0.44 0.44	V	* V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	_	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
I _{OLD}	†Minimum Dynamic	5.5	_	_	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}	Output Current	5.5	-	-	-75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	4.0	40	μΑ	$V_{IN} = V_{CC}$ or GND

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V.

AC CHARACTERISTICS

				74AC		74	AC	
Symbol	Parameter	V _{CC} * (V)	T _A = +25°C C _L = 50 pF		$T_A = -40^{\circ}C \text{ to } +8$	Unit		
		(-,	Min	Тур	Max	Min	Max	
t _{PZL}	Propagation Delay Output Enable	3.3	1.5	-	8.0	1.0	9.0	ns
		5.0	1.5	-	6.0	1.0	6.5	
t _{PLZ}	Propagation Delay Output Enable	3.3	1.5	-	8.0	1.0	9.0	ns
		5.0	1.5	_	6.0	1.0	6.5	

^{*}Voltage Range 3.3 V is 3.3 V ± 0.3 V. Voltage Range 5.0 V is 5.0 V ± 0.5 V.

DC CHARACTERISTICS

			74	СТ	74ACT		
Symbol	Parameter	V _{CC} (V)	T _A = +25°C		$T_A = -40^{\circ}C$ to $+85^{\circ}C$	Unit	Conditions
		(-)	Тур	G	uaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA
		4.5 5.5	-	0.36 0.36	0.44 0.44	0.44	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ I_{OH} 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
ΔI_{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	-	1.5	mA	$V_{I} = V_{CC} - 2.1 \text{ V}$
I _{OLD} I _{OHD}	†Minimum Dynamic Output Current	5.5 5.5	_ _	_	75 –75	mA mA	V _{OLD} = 1.65 V Max V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	4.0	40	μΑ	$V_{IN} = V_{CC}$ or GND

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

*All outputs loaded; thresholds on input associated with output under test.
†Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

				74ACT		74A	CT	
Symbol	Parameter		V_{CC}^* $T_A = +25^{\circ}C C_L = 50 pF$		$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C C}_L = 50 \text{ pF}$		Unit	
		(-,	Min	Тур	Max	Min	Max	
t _{PZL}	Propagation Delay Output Enable	5.0	1.5	_	8.0	1.0	8.5	ns
t _{PLZ}	Propagation Delay Output Enable	5.0	1.5	-	8.5	1.0	9.0	ns

^{*}Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	30	pF	V _{CC} = 5.0 V

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74AC05DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74AC05DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74ACT05DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74ACT05DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74ACT05DTR2G	TSSOP-14 (Pb-Free)	2500 / Tape & Reel

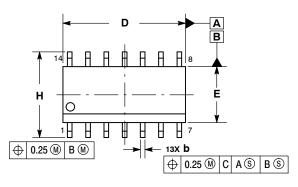
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

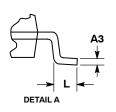


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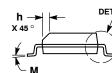
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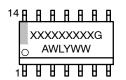




- NOTES:
 1. DIMENSIONING AND TOLERANCING PER
 - ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 - DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT
- MAXIMUM MATERIAL CONDITION.
 DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
- 5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE

	MILLIM	IETERS	INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	1.35	1.75	0.054	0.068	
A1	0.10	0.25	0.004	0.010	
АЗ	0.19	0.25	0.008	0.010	
b	0.35	0.49	0.014	0.019	
D	8.55	8.75	0.337	0.344	
Е	3.80	4.00	0.150	0.157	
е	1.27	BSC	0.050 BSC		
Н	5.80	6.20	0.228	0.244	
h	0.25	0.50	0.010	0.019	
L	0.40	1.25	0.016	0.049	
M	0 °	7°	0 °	7°	

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code Α = Assembly Location

WL = Wafer Lot Υ = Year WW = Work Week = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator. "G" or microdot " ■". may or may not be present.

SOLDERING FOOTPRINT*

1	6.50 –	-	14X 1.18
			_ 1.27
_			PITCH
14X 1			
14X 10.58			

DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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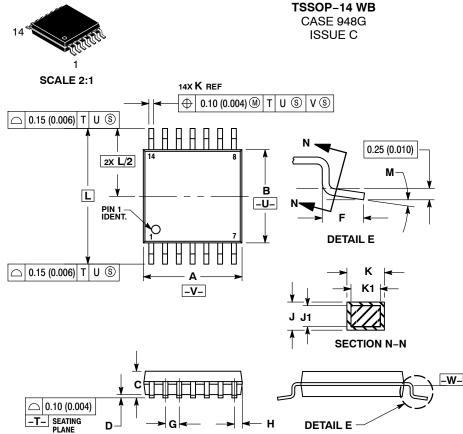
SOIC-14 CASE 751A-03 ISSUE L

DATE 03 FEB 2016

STYLE 1: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. NO CONNECTION 7. ANODE/CATHODE 8. ANODE/CATHODE 9. ANODE/CATHODE 10. NO CONNECTION 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 2: CANCELLED	STYLE 3: PIN 1. NO CONNECTION 2. ANODE 3. ANODE 4. NO CONNECTION 5. ANODE 6. NO CONNECTION 7. ANODE 8. ANODE 9. ANODE 10. NO CONNECTION 11. ANODE 12. ANODE 13. NO CONNECTION 14. COMMON CATHODE	STYLE 4: PIN 1. NO CONNECTION 2. CATHODE 3. CATHODE 4. NO CONNECTION 5. CATHODE 6. NO CONNECTION 7. CATHODE 8. CATHODE 9. CATHODE 10. NO CONNECTION 11. CATHODE 12. CATHODE 13. NO CONNECTION 14. COMMON ANODE
STYLE 5: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. NO CONNECTION 7. COMMON ANODE 8. COMMON CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. ANODE/CATHODE 12. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 6: PIN 1. CATHODE 2. CATHODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE 7. CATHODE 8. ANODE 9. ANODE 10. ANODE 11. ANODE 12. ANODE 13. ANODE 14. ANODE	STYLE 7: PIN 1. ANODE/CATHODE 2. COMMON ANODE 3. COMMON CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. ANODE/CATHODE 7. ANODE/CATHODE 8. ANODE/CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. COMMON CATHODE 12. COMMON ANODE 13. ANODE/CATHODE 14. ANODE/CATHODE	STYLE 8: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. ANODE/CATHODE 7. COMMON ANODE 8. COMMON ANODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. NO CONNECTION 12. ANODE/CATHODE 13. ANODE/CATHODE 14. COMMON CATHODE

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DATE 17 FEB 2016

- NOTES.

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.

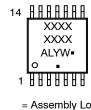
 3. DIMENSION A DOES NOT INCLUDE MOLD
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
 DIMENSION B DOES NOT INCLUDE
- INTERLEAD FLASH OR PROTRUSION.
 INTERLEAD FLASH OR PROTRUSION SHALL
- INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.

 5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.

 6. TERMINAL NUMBERS ARE SHOWN FOR DEFERENCE ONLY.
- REFERENCE ONLY.
 DIMENSION A AND B ARE TO BE
 DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
Α	4.90	5.10	0.193	0.200
В	4.30	4.50	0.169	0.177
С		1.20		0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
Н	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
М	0°	8 °	0 °	8 °

GENERIC MARKING DIAGRAM*



= Assembly Location

= Wafer Lot ٧ = Year

W = Work Week

= Pb-Free Package (Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

SOLDERING FOOTPRINT		
7.	06	
1		
		
J	———— PITCH	
14X 0.36		
0.36 → 1.26	DIMENSIONS: MILLIMETERS	

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